

PATENT CLAIMS

1. A locking arrangement comprising a lock unit and a counter part for locking a turnable door, hatch or the like, and a door frame or the like together, the lock unit and the counter part being installable in the said lockable parts, **characterised in**

that the lock unit includes a first locking element comprising a first free end and which in the installation position is mainly transversely in relation to the swing axis of the turnable part,

that the counter part includes a second locking element comprising a second free end and which in the installation position is mainly transversely in relation to the swing axis of the turnable part,

that the said locking elements are arranged to work together so that when the said units are against each other in their installation position while the door, hatch or the like is in its closed position, they are overlapping each other,

and that the arrangement comprises an acting element that comprises an arm, the first end of which includes a hinge means and the arm includes a gripping bracket, while the acting element is fastened to the body of the lock unit by the hinge means, whereby the arm can turn in relation to the hinge point formed by the hinge means,

when various modes of locking can be produced depending on the position of the arm, and which arm being controllably supported, the locking is achieved,

which arm is arranged to act transversely in relation to the said locking elements for achieving the locking so that in the said position the overlapping locking elements together with the acting element prevent the lock unit and the counter part from moving away from the said position being against each other by causing the said units to grip each other.

2. An arrangement according to claim 1, **wherein** the lock unit comprises a safety catch for the acting element for controlled support of the acting element,

by means of which the acting element is locked in the front position for achieving the said locking, whereby the safety catch is on, and

by means of which the opening of the said locking is made possible, whereby the safety catch is off and the acting element is allowed to move in the withdrawn position.

3. An arrangement according to claim 2, **wherein** the first locking element is a bracket fastened by its one end to the body of the lock unit and the second lock unit is a bracket fastened by its one end to the body of the counter part, the free ends of the brackets allowing the brackets to be in the said overlapping position.

4. An arrangement according to claim 2 or 3, **wherein** there is a gap between the first locking element and the acting element, the width of which depends on the position of the acting element,

whereby the gap is at its widest when the acting element is in the withdrawn position and at its narrowest when the acting element is at its front position, in which front position the gap is arranged so that the second locking element has enough room for itself in the said overlapping position.

5. An arrangement according to claim 4, **wherein** while the acting element is in the front position and the safety catch is on and the locking elements are overlapping the locking is closed,

and when the safety catch is off while the acting element is still in the front position and the two locking elements are overlapping each other, the locking is open, in which state a force acting on the lock unit or the counter part, separating the units, will pull the second locking element from the gap, whereby the second locking element will simultane-

ously push the acting element into the withdrawn position, and whereby the second free end moves past the first free end.

6. An arrangement according to claim 5, **wherein** it comprises a holding spring for keeping the acting element in the withdrawn position, whereby the locking is open with the acting element in the withdrawn position.

7. An arrangement according to claim 2, 3, 3, 5 or 6, **wherein** the safety catch comprises a reel, the central point of which is on the side of the acting element while the circumference of the reel presses on the counter surface formed by the rear edge of the arm when the safety catch is on and

when the safety catch is off, the central part of the reel is outside the rear edge of the arm, whereby the reel allows the arm to be moved into its withdrawn position by an external force.

8. An arrangement according to claim 7, **wherein** the safety catch comprises an arm, onto which a reel is fastened, and

which is fastened by its fastening end to the body of the lock unit via a second hinge and by its other end to the drive construction structures,

while the arm of the safety catch can be moved in relation to a second hinge point formed by the second hinge by the power, if any, acting on the acting element or transmitted via the drive construction.

9. An arrangement according to claim 8, **wherein** the force, if any, transmitted by the drive construction moves the arm of the safety catch so that the central point of the reel is on the side of the rear edge of the arm or outside it.

10. An arrangement according to claim 9, **wherein** the drive construction comprises a transferring arm, hinged by its one end to the arm of the safety catch and by its other end to the other drive construction.

11. An arrangement according to claim 10, **wherein** the other drive construction comprises a transmission screw, a transmission spring and a

supporting arm, the arm being hinged by its one end to the body of the lock unit and by its other end to the said transferring arm,

the transmission spring being essentially u-shaped and supported by its one end to the screw thread of the transmission screw and by its other end to the central part of the supporting arm, the spring being additionally supported at its curve to the body of the lock unit,

whereby the force, if any, rotating the screw, moves the end of the spring supported in the screw thread, whereby the movement of the spring moves the supporting arm and the transferring arm via the supporting arm fastening, whereby also the arm of the safety catch moves.

12. An arrangement according to claim 10, **wherein** the other drive construction comprises a transmission screw, a transmission arm and a supporting arm, the arm being hinged by its one end to the body of the lock unit and by its other end to the transmission arm,

the transmission arm being fastened by its one end to the screw thread of the transmission screw and hinged by its central part to the transferring arm,

whereby the force, if any, rotating the screw will move the other end of the transmission arm supported in the screw thread, whereby the movement caused by this will move the transferring arm, thus also causing the arm of the safety catch to move.

13. An arrangement according to any of the claims 10-12, **wherein** the transmission screw is connected to an electric motor for producing the force, if any, rotating the screw.

14. An arrangement according to claim 2, 3, 4, 5 or 6, **wherein** the safety catch comprises a first arm and a second arm that have been hinged together at the first ends of the arms forming a toggle joint between the arms, the second end of the first arm being hinged to the lower end of the acting element and the second end of the second arm being hinged to the lockbody.

15. An arrangement according to claim 14, wherein the system comprises a drive construction that comprises a transferring arm, a drive wheel, a worm wheel, guiding means between said wheels and a transmission screw,

the transferring arm being connected to the hinge between the first and second arm and to the drive wheel,

the drive wheel being inserted into the worm wheel and being capable of rotating in respect of the worm wheel, both wheels having common axis point and being capable of rotating in respect of said axis point, the wheels being capable of turning each others via the guiding means in desired ways,

the drive wheel being in connection with the transmission screw when potential torsion force rotates the worm wheel, which in turn turns the drive wheel and the transferring arm moving the safety catch in a desired way.

16. An arrangement according to claim 15, wherein the drive wheel comprises a connection pin for the transferring arm, a central hole and a drive hole; and the worm wheel comprises a central pin, a drive pin and a gear cutting on the edge of the wheel,

the drive wheel being attachable to the worm wheel so that the drive pin penetrates to the drive hole and the central pin to the central hole,

the system further comprising a spring, which is situated between the wheels, around the central pin,

the central hole and the central pin forming the common axis point, and the drive hole, the drive pin and the spring forming the guiding means.

17. An arrangement according to claim 15 or 16, wherein the system comprises a coupling gear through which the transmission screw is connectable to an electric motor.

18. An arrangement according to claim 13 or 17, **wherein** the arrangement comprises a control unit being connected to the electric motor.

19. An arrangement according to claim 18, **wherein** the control unit can control the electric motor as a response to an external signal.

20. An arrangement according to any of the claims 11-19, **wherein** the transmission screw is connected to a mechanical power apparatus.

21. An arrangement according to any of the claims 4-20, **wherein** the first free end is bevelled to the side of the inner edge of the bracket of the first locking element,

and the second free end comprises a bevelled surface on the side of the inner edge of the bracket of the second locking element, the bevelled surfaces facilitating the overlapping movement of the brackets.

22. An arrangement according to claim 21, **wherein** seen from the first free end after the bevel the inner edge of the first locking element comprises a notch,

the outer edge of the second locking element comprises a convex curved surface adjacent the second free end or beginning from the second free end,

while the curved surface of the second locking element and the bevelled surface of the inner edge terminate in the arm of the bracket at a point in which the arm starts to curve outwards, making a curve before the fastening end of the bracket of the second locking element,

whereby an indentation remains between the curved surface and the curve, and

the acting element comprises a tab of the bracket, which is located in the position of the indentation of the bracket of the second locking element when the gap is at its narrowest and the brackets overlapping, whereby in this position the inside surface located in the position of the indentation of the second locking element additionally settles into the notch of the first locking element.

23. An arrangement according to claim 22, **wherein** the surfaces of the tab of the gripping bracket are essentially straight on both sides of the tab or on the side of the tab onto which the force, if any, from the second locking element acts.

24. An arrangement according to any of the claims 6-23, **wherein** the arm comprises a groove into which the holding surface of the holding spring is located when the arm moves to the withdrawn position, whereby the arm stays in the withdrawn position.

25. An arrangement according to claim 24, **wherein** the holding spring comprises a releasing bracket, via which the force, if any, acting on the releasing bracket moves the holding surface away from the groove, whereby the arm can move to the front position.

26. An arrangement according to claim 25, **wherein** when the second free end passes the first free end and the brackets are moving into overlapping position the second free end pushes the releasing bracket of the holding spring.

27. An arrangement according to any of the claims 3-26, **wherein** the lock unit comprises a friction surface, located on the side of the side edge of the acting arm acting as a support surface when the opening force, if any, acts on the gripping bracket of the acting element, with the friction surface and the support surface being in contact with each other during the said opening force.

28. An arrangement according to claim 25, **wherein** the friction surface is essentially on the level of the gripping bracket of the acting element.

29. An arrangement according to any of the claims 3-28, **wherein** the second locking element is fastened via a second hinge to the counter part, making it possible for the second locking element to move in relation to the hinge point formed by the this hinge.

30. An arrangement according to any of the claims 3-29, wherein the counter part is provided with an indentation into which the first locking element settles when the units are in the said installation position.

31. An arrangement according to any of the claims 3-30, wherein the design of the locking elements and the acting element prevents the lock unit and the counter part from moving away from the said position against each other.

32. An arrangement according to any of claims the 2-31, wherein the locking arrangement comprises a sensor for observing the position of the safety catch.

33. An arrangement according to any of the claims 3-32, wherein the counter part comprises a spring for keeping the second locking element in the desired position.

34. A method for the operations of a locking arrangement, the locking arrangement comprising a lock unit and a counter part which are installable to structures to be locked to each other, characterized in that the lock unit is provided with a first locking element and an acting element, with a gap therebetween and that the counter part is provided with a second locking element,

while the first locking element comprises a first free end and the second locking element comprises a second free end, whereby when the said units are in installation position against each other, i.e. with the structures being against each other in their closed position, the locking elements are located overlapping each other,

in which method by means of the said components of the locking arrangement:

there is provided the possibility of changing the gap between the first locking element and the acting element,

the various operating modes of the lock are made possible, and

there is provided a possibility of locking the gap at such a width that in the installation position the second locking element of the counter part located in the gap stays in the gap, locking the lock unit and the counter part to each other.

35. A method according to claim 34, **wherein** the width of the locked gap is such that the second locking element has just enough space there, whereby the second locking element stays in the gap due to the form of the gap, which is due to the design of the locking elements and the acting element.

36. A method according to claim 34 or 35, **wherein** the locking is opened, whereby the width of the gap is allowed to increase, whereby the second locking element can move away from the gap.

37. A method according to claim 36, **wherein** when the gap is wide, it is maintained wide, until the holding is released, whereby the gap is allowed to turn narrower.